



Technical Data

TYPE RS-125 VHF-UHF RECEIVING SYSTEM

The CEI Type RS-125 VHF-UHF Receiving System provides AM, FM, CW, and Pulse reception over the 30-1000 mc frequency range in four bands. Various IF bandwidths are selected by plug-in modules. A visual display of signals in a band around the received signal is provided. A list of the units in the RS-125 Receiving System and a brief description of each is presented in the following paragraphs.

The RS-125 consists of the following units:

- (1) VT-30 VHF Tuner
- (2) UT-1000 UHF Tuner
- (3) DM-4 Demodulator and associated plug-in modules
- (4) SM-9401 Signal Monitor
- (5) SP-101 Storage Panel

The DM-4 Demodulator will accept four of the nine available plug-in units at one time in various combinations. The nine plug-in modules are:

- (1) IFD-15 IF Demodulator (15 kc bandwidth)
- (2) IFD-50 IF Demodulator (50 kc bandwidth)
- (3) IFD-200 IF Demodulator (200 kc bandwidth)
- (4) IFD-500 IF Demodulator (500 kc bandwidth)
- (5) IFD-2000 IF Demodulator (2 mc bandwidth)
- (6) IFD-8000 IF Demodulator (8 mc bandwidth)
- (7) NS-101 Noise Silencer
- (8) AGC-BC Box Car AGC
- (9) AGC-PS Pulse Stretching AGC

VT-30 VHF TUNER

The VT-30 Tuner covers the frequency range of 30-260 mc in two bands. Band A covers from 30 mc to 60 mc and Band B covers from 54 to 260 mc. The incoming signal is converted to a 21.4-mc IF output which is applied to the DM-4. An AGC voltage is derived in the DM-4 and applied back to the RF stages in the VT-30 to increase the dynamic range of the tuner.

UT-1000 UHF TUNER

The UT-1000 UHF Tuner covers a frequency range of 235-1000 mc in two bands. Band A covers from 235 to 500 mc and Band B covers from 490 mc to 1000 mc. The incoming signal is first converted to 60 mc and then to a 21.4-mc IF output which is used in the DM-4. An AGC input derived from the DM-4 and applied to the RF stages and the 60 to 21.4 mc converter gives the UT-1000 additional dynamic range.

DM-4 DEMODULATOR UNIT

The DM-4 Demodulator unit, when used in conjunction with various IFD modules and AGC modules, provides AM, FM, Pulse, and CW reception from a 21.4-mc IF signal. This 21.4-mc signal will generally be derived from either the VT-30 VHF Tuner or the UT-1000 UHF Tuner.

The DM-4 provides the following outputs; all are derived from a single IF input from an RF tuner: five video outputs; two AGC signals; two audio outputs; one IF predetection output; and one module indicator output.

A speaker and two meters are provided to monitor audio, tuning, and signal strength.

SM-9401 SIGNAL MONITOR

The SM-9401 Signal Monitor is designed for use with the RS-125 Receiving System. It provides a visual display of signals in a band around the received signal.

The SM-9401 features a transistorized sweep and horizontal deflection system, employing unique circuitry. Nuvistors are used in the RF section. A highly stable RF sweep is provided by a variable capacitance diode. A higher order of sweep linearity is achieved by use of a unique solid-state shaping network for the sweeping oscillator. Higher light output has resulted from the use of 1300 volts on the cathode-ray tube.

Base line breakup due to overload on strong signals, present in most signal monitors, has been eliminated by direct coupling of the detector to the CRT deflecting plates. This makes it possible to observe weak signals close to very strong signals.

IF DEMODULATORS

The IF Demodulators that are presently available for use in the DM-4 provide AM, FM, and CW reception and cover a bandwidth range from 15 kc to 8 mc.

In the AM or FM modes, the gain of the modules may be controlled by an internally-generated AGC, an external AGC from one of the AGC modules, or manual gain control. Only manual gain control is possible when the modules are in the BFO mode. An internal 21.4-mc BFO is activated when the BFO mode is selected.

AGC MODULES

The two types of AGC modules are used in conjunction with the IFD modules to provide pulse reception.

They both function by taking a detected video from an IFD module and stretching or detecting the pulse peak and then applying this voltage back to the IFD in the form of an AGC voltage. The AGC modules have selectable time constants to change the AGC characteristics.

NS-101 NOISE SILENCER

The Type NS-101 Noise Silencer is designed for the reception of AM and CW signals from a 21.4-mc IF signal input. The NS-101 has the capability to remove pulse-type noise interference which is present on the amplitude of an incoming signal.

SP-101 STORAGE PANEL

The SP-101 Storage Panel is used to store the plug-in modules which are not installed in the DM-4.



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TYPE VT-30 VHF TUNER



SPECIFICATIONS

Frequency Range	30 to 260 mc in two bands: Band A: 30-60 mc Band B: 54-260 mc
Input Impedance	50 ohms; VSWR less than 3.1 within the pass band
Noise Figure	Band A; 7 db, maximum Band B; 10 db, maximum
Image Rejection	56 db, minimum
IF Rejection	Band A: 40 db, minimum Band B: 80 db, minimum
Oscillator Radiation at Input of Tuner	25 μ v, maximum
Fine Tuning Range	$\pm 0.1\%$ of dial reading
Nominal Gain	33 db
Gain Variation with Tuning	6 db max.
Over-all Bandwidth	3.0 mc, minimum
Ripple Across Pass Band	3 db, maximum
Stability vs Input Level (Signal Input up to -20 dbm)	0.003% maximum
Incidental FM of Local Oscillator	2 parts in 10^5 maximum

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AM Compression	1 db maximum with signal input up to -20 dbm with AGC applied to tuner
Local Oscillator	-10 dbm (70 mv) minimum into 50 ohm load
IF Outputs	2 - 21.4 mc
Signal Monitor Output ...	21.4 mc
Analog Tuning Voltage Output	-1.0 volt at the low end of the band. -11.0 volts at the high end of the band
Remote Band Indicator Output	Binary (closed on Band A; open on Band B)
Over-all Size	19-inches wide, 3.5-inches high, and 16.6-inches deep
Input Power	105-125 volts, 48-62 cycles
Power Consumption	17 watts, approximately
Weight	17 pounds, approximately

Specifications subject to change without change

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TYPE UT-1000 UHF TUNER



SPECIFICATIONS

Frequency Range	235 to 1000 mc in two bands: Band A; 235-500 mc Band B; 490-1000 mc
Input Impedance	50 ohms; VSWR less than 2.1 within the pass band
Noise Figure	15 db maximum
Image Rejection	60 db minimum
I.F. Rejection	80 db minimum
Oscillator Radiation at Input of Tuner	Band A; 90 μ v max. Band B; 225 μ v max.
Fine Tuning Range	$\pm 0.1\%$ of dial reading
Over-all Bandwidth	Band A; 6 mc minimum Band B; 8 mc minimum
Nominal Gain	20 db
Manual Gain Control	± 6 db from nominal
Gain Variation with Tuning	6 db max.
Ripple Across Pass Band	3 db max.
Stability vs Input Level (Signal Input up to -20 dbm)	0.005% max.

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Incidental FM of local Oscillator	2 parts in 10^5 max.
AM Compression	1 db maximum with signal input up to -20 dbm with AGC applied to tuner
Local Oscillator Output	-10 dbm, minimum, into 50 ohm load (71 mv)
IF Outputs (No. 1 and 2)	2 - 21.4 mc
Signal Monitor Output	21.4 mc
Analog Tuning Voltage Output	-1.5 volts at the low end of the band. -11.5 volts at the high end of the band
Remote Band Indicator Output	Binary (closed on Band A; open on Band B)
Over-all Size	19-inches wide, 3.5-inches high, and 14.5-inches deep
Input Power	105-125 vac, 48-62 cps
Weight	20 lbs max.

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TYPE DM-4 DEMODULATOR



SPECIFICATIONS

Input Frequency	21.4 mc
Input Bandwidth	12 mc, minimum
Plug-in Modules	Accepts four
Pre-detection Output	21.4 mc predetection signal from module in operation. Will produce 10 mv min., into a 50 ohm load
Audio Outputs	600 ohms at 0.1 watt for external load (Speaker or phones)
Internal Speaker	Disconnected when phones are plugged in
Audio Frequency Response	250 cps to 6 kc at 3 db points
Audio Pulse Stretcher	Pulse stretcher included for aural enhancement of pulse signals. Pulse stretcher has a rise time of 0.1 μ sec and a decay time of 80 μ sec
Low-Level Video Outputs	Two: Aux A-Scan and Tracking Video. Each provides 0.5 volt rms into a 91 ohm load, with response from dc to 4 mc

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High Level Video Outputs	Three: Analysis and Recorder outputs each provide 1.0 volt RMS into 91 ohm load, with response from 10 cps to 4 mc. The A scan output provides 1.0 volt RMS into a 10K load, with response from 10 cps to 4 mc
AGC Monitor Output	Delivers from 0 to -12 volts into a 10K load
Module Indicator Output	Provides 1 volt incremental steps into a 10K load to indicate module in use
Tuner AGC Output	Delivers from 0 to -24 volts into a 100K load
Meters	Tuning and signal strength; operate from module in use
Input Power	105-125 volts, 48-62 cps
Power Consumption	20 watts, approximately, with four modules installed
Weight	25 lbs, approximately, with four modules installed
Over-all Size	5.25-inches high, 19-inches wide, and 18-inches deep

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TYPE SM-9401 SIGNAL MONITOR



SPECIFICATIONS

Number of Inputs	One, type BNC
Input Impedance	50 ohms
Input Center Frequency	21.4 mc
Range of Center Frequency Control	± 200 kc
Flatness of Response	4 mc ± 2 db
Sweepwidth	0-4 mc, continuously adjustable
Sweep Linearity	Linear over-all to within 5% of the total sweep width
Sweep Rate	30 cps ± 6 cps
Resolution	Using approximately 100-kc sweep width, two signals 20-kc apart will be displayed with at least a 6-db valley between the peaks.
IF Frequencies	4.3 mc and 950 kc
Oscillator Frequencies	
1st Local Oscillator	25.7 mc $\pm 1/2$ sweep width
2nd Local Oscillator	5.25 mc
Image Rejection	50 db, minimum
IF Rejection	60 db, minimum
Sensitivity	10 μ v input at 21.4 mc produces at least one inch vertical deflection on the CRT
Gain Control Range	60 db, minimum
Vertical Display Response	Linear
CRT Display Type	3XP1
Front Panel Controls	Center Frequency, Sweep Width, Gain, Focus, Intensity, Power
Power Input	115 volts, 50-400 cps
Power Consumption	17 watts, approximately
Weight	10 lbs, approximately
Size	3.5-inches high, 19-inches wide, and 14-inches deep

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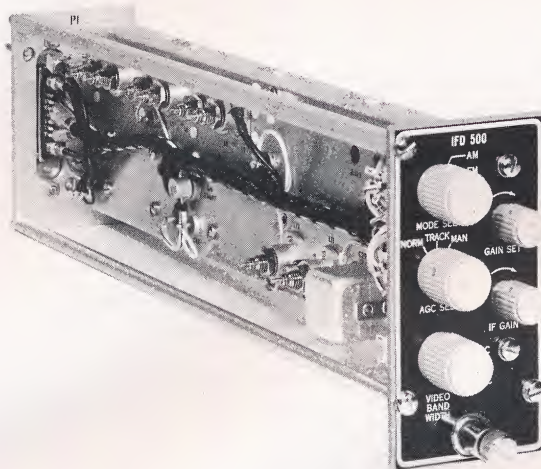
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IFD-SERIES MODULES



TYPE IFD-500 IF DEMODULATOR

There are six plug-in modules currently available for use with the DM-4 Demodulator; each module has a different bandwidth, ranging from 15 kc to 8 mc. The modules are designated IFD-15, IFD-50, IFD-200, IFD-500, IFD-2000, and IFD-8000.

SPECIFICATIONS

Types of Reception	AM, FM, and CW
Center Frequency	21.4 mc
Dynamic Range	From noise up to 100 mv using AGC or manual gain control.
Bandwidth	IFD-15, 15 kc ± 1.5 kc; IFD-50, 50 kc ± 5 kc; IFD-200, 200 kc ± 20 kc; IFD-500, 500 kc ± 50 kc; IFD-2000, 2 mc ± 200 kc; IFD-8000, 8 mc ± 800 kc
Distortion	AM: 5%, maximum, when modulated 30% at 1 kc rate FM: 5%, maximum, when modulated at 1 kc with deviation corresponding to 1/5 of the IFD bandwidth
Spurious Response	Response falls off smoothly to 60 db down without abrupt discontinuities or amplitude inversions
Input Impedance	50 ohms; VSWR 1.5 to 1, maximum
Types of Gain Control	Normal (AGC), tracking or manual
Normal Gain Control	Internal AGC circuit maintains output level within 3 db over an input signal level range as follows: IFD-15, 53 μ v to 0.1 volt; IFD-50, 98 μ v to 0.1 volt; IFD-200, 196 μ v to 0.1 volt; IFD-500, 312 μ v to 0.1 volt; IFD-2000, 623 μ v to 0.1 volt; IFD-8000, 1.24 μ v to 0.1 volt. The AGC will respond to signal variations up to 3 cycles and roll off at approximately 12 db per octave. The AGC will hold the second detector output level to approximately 1 vdc on CW signals.
Tracking Gain Control	Module gain controlled by an external high performance pulse-type AGC.
Manual Gain Control	A manual gain control is provided which will vary the gain from maximum to 60-db below maximum.
Stability with Normal (AGC) Gain Control	The center frequency will not change more than $\pm 10\%$ or the bandwidth by more than $\pm 5\%$ over the AGC range.

AGC Voltage Gain	Approximately 30 db
FM Output Stability	Output varies less than 6 db for an input signal level change of 60 db.
Beat Frequency Oscillator	Internal 21.4 mc BFO; adjustable ± 10 kc from demodulator main chassis. The BFO is stable to 100 cycles per minute at a constant temperature
Video Output Bandwidth	Three, selectable by front panel switch as follows: IFD-15, 1 kc, 3 kc, or 10 kc; IFD-50, 3 kc, 10 kc, or 30 kc; IFD-200, 30 kc, 60 kc, or 100 kc; IFD-500, 30 kc, 100 kc, or 250 kc; IFD-2000, 100 kc, 600 kc, or 1 mc; IFD-8000, 1 mc, 2 mc, or 4 mc.
Video Amplifier	Video amplifier will drive a 93-ohm load up to the maximum level of the video (AM or FM)
Pre-detection Output	A 21.4 mc pre-detection output will provide 20 mv minimum. This output will exhibit all AGC characteristics and will work into a 50-ohm load
Shape Factor (60 to 6 db)	3 to 1 for IFD-15 and IFD-50; 5 to 1 for IFD-200, IFD-500, and IFD-2000; 7.5 to 1 for IFD-8000
Ripple Across Pass Band	2 db, maximum
Input Power	+ 12 vdc and -12 vdc, supplied by DM-4 Demodulator
Size	4.5-inches high, 2.25-inches wide, and 13-inches deep
Weight	2.75 lbs, approximately

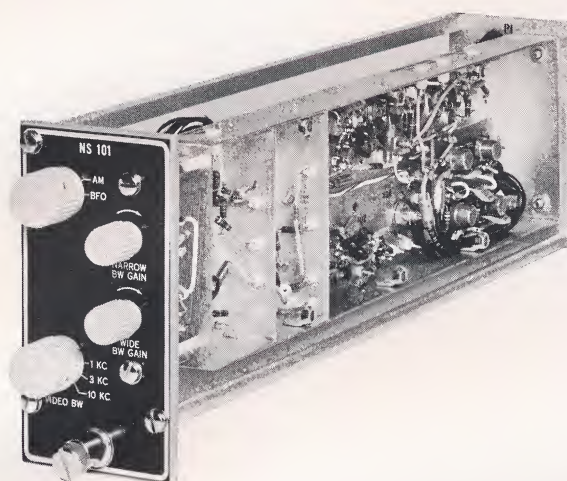
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TYPE NS-101 NOISE SILENCER



SPECIFICATIONS

Types of Reception	AM and CW
Center Frequency	21.4 mc
Bandwidth	2-mc \pm 200 kc and 15 kc \pm 1.5 kc. The over-all bandwidth is 15 kc \pm 1.5 kc, with the 2-mc bandwidth section preceeding the limiters and the 15-kc bandwidth section.
Distortion	5%, maximum, when modulated 30% at 1 kc rate
Spurious Response	Response falls off smoothly to 60 db down without abrupt discontinuities or amplitude inversions
Input Impedance	50 ohms; VSWR 1.5 to 1, maximum
Gain Control	Separate manual gain controls are provided for the 2-mc bandwidth section and the 15-kc bandwidth section.
IF Amplifier	The gain of the 2-mc section of the IF amplifier is sufficient to produce full limiting on input signal levels of 200 μ v. The associated manual gain control will vary the gain of this section from maximum to 20 db below maximum. The gain of the 15-kc section of the IF amplifier is sufficient to produce 1.0 volt of peak noise at the AM detector output when the noise input to the 15-kc crystal filter is fully limited. The associated manual gain control will vary the gain of this section from maximum to 30 db below maximum.
Beat Frequency Oscillator	Internal 21.4 mc BFO; adjustable \pm 10 kc from demodulator main chassis. The BFO is stable to 100 cycles per minute at a constant temperature.
Video Output Bandwidth	1 kc, 3 kc, or 10 kc selectable by front panel switch
Video Amplifier	Video amplifier will drive a 93-ohm load up to the maximum level of the video.
Pre-detection Output	A 21.4 mc pre-detection output will provide 20 mv, minimum, into a 50-ohm load
Shape Factor (60 to 6 db)	3 to 1
Ripple Across Pass Band	2 db, maximum
Input Power	+12 vdc at 40 ma, maximum, and -12 vdc at 30 ma, maximum
Size	4.5-inches high, 2.25-inches wide, and 13-inches deep
Weight	2.75 lbs, approximately

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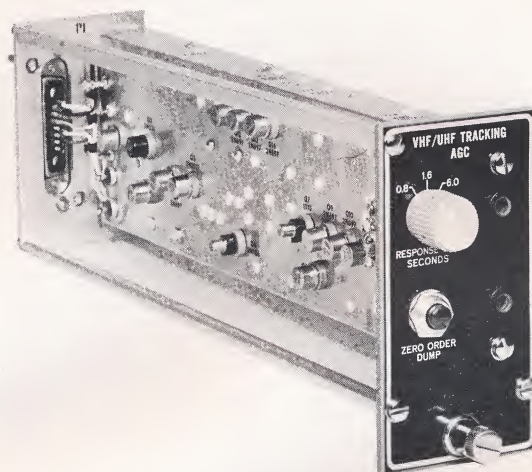
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TYPE AGC-BC BOX CAR AGC



SPECIFICATIONS

Types of Operation	Automatically provides special peak-type AGC from incoming pulse signals or average-type AGC from incoming AM or CW signals.
Dominant Filter Time Constants	Three: 0.8, 1.6, and 6.0 seconds, selectable by front-panel switch
Input Impedance	5K, approximately
AGC Threshold Level	0.4 volts peak
AGC Voltage Gain	30, approximately
AM Output Stability	The AM output signal from the associated IFD module will vary less than 2 db for signals above the AGC threshold level.
AGC Reset	Front-panel push-button switch (Zero Order Dump) provided to instantaneously discharge AGC filter
Input Power	+ 24 volts at 30 ma, max; -24 volts at 10 ma, max.
Size	4.5-inches high, 2.25-inches wide, and 13-inches deep
Weight	2 lbs, approximately

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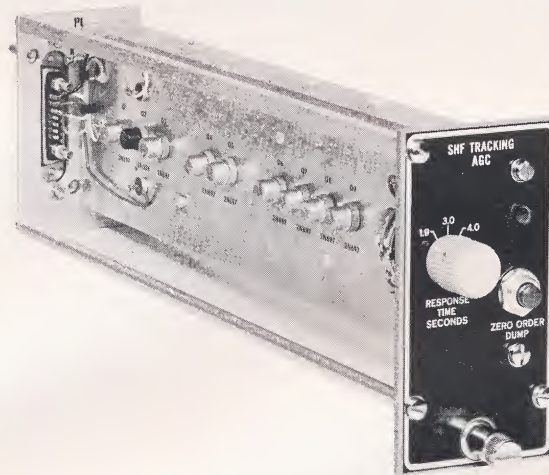
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TYPE AGC-PS PULSE STRETCHING AGC



SPECIFICATIONS

Type of Operation	Automatically provides peak-type AGC from incoming pulse signals and average-type AGC from incoming AM and CW signals.
Incoming Pulse Range	58 to 20,000 pps
Dominant Filter Time Constants	Three: 1.9, 3.0, and 4.0 seconds, selectable by front-panel switch
Input Impedance	500 ohms, approximately
Video Bandwidth	From dc to 4 mc
AGC Voltage Gain	Approximately 30
AGC Threshold Level	0.4 volts peak
AM Output Stability	The AM output signal from the associated IFD module will vary less than 2 db for signals above the AGC threshold level
AGC Reset	Front-panel push-button switch (Zero Order Dump) provided to instantaneously discharge AGC filter
Input Power	+ 24 volts at 7 ma, max; -24 volts at 6 ma, max
Size	4.5-inches high, 2.25-inches wide, and 13-inches deep
Weight	2 lbs. approximately

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